SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-42

Name: Marindahl **County**: Yankton
Legal Description: T95N-R54W-Sec. 7, 17, 18, 20
Location from nearest town: 4 miles west and 3 miles south of Irene, SD.

Dates of present survey: June 9, 2009 (electrofishing); August 10-12, 2009 (netting)
Dates of last survey: June 11, 2007 (electrofishing); August 13-15, 2007 (netting)

Primary Game Species	Other Species
Largemouth Bass	Channel Catfish
Bluegill	Black Bullhead
Black Crappie	Common Carp
	White Sucker
	Green Sunfish

PHYSICAL DATA

Surface area: 139 acres (56.3 ha) **Watershed area**: 42,889 acres (17,370 ha)
Maximum depth: 30 feet (9.4 m) **Mean depth**: 13 feet (4 m)
Volume: 1746.5 acre feet **Shoreline length**: 3.8 miles
Contour map available: Yes **Date mapped**: 1985
Lake elevation observed during the survey: Full
Beneficial use classifications: (4) Warmwater permanent fish propagation, (7) immersion recreation, (8) limited-contact recreation, and (9) fish and wildlife propagation and stock watering.

Introduction

Marindahl Lake is an artificial impoundment created when the South Dakota Department of Game, Fish and Parks (GFP) constructed an earthen dam across Clay Creek in 1952. The lake was chemically renovated in 1988 to remove overabundant carp and bullhead populations.

Ownership of Lake and Adjacent Lakeshore Properties

Marindahl Lake and the surrounding shoreline are owned and managed by the South Dakota Department of Game, Fish and Parks (GFP).

Fishing Access

The Marindahl Lake Access Area is located on the southwest corner of the lake near the dam and contains a single lane boat ramp with a dock, public toilet and many shore fishing areas. There are many other shore fishing areas around the entire lake. Several improvements to the fishing access roads were completed in 2009.

Field Observations of Water Quality and Aquatic Vegetation

The water in Marindahl during the survey was stained brown with a Secchi depth measurement of 2 m (79 in.). Sparse stands of sago pondweed (*Potamogeton pectinatus*) were observed. Various sedges (*Carex spp.*) were found along the shoreline and cattail (*Typha spp.*) was common in the north end of the lake.

BIOLOGICAL DATA

Methods:

Marindahl Lake was sampled on August 10-12, 2009 with ten overnight trap net sets. The trap nets are constructed with 19-mm-bar-mesh (3/4 in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. Two hours of nighttime electrofishing was done on June 9, 2007 to evaluate the largemouth bass population. Trap net and electrofishing sites are displayed in Figure 4.

Results and Discussion:

Trap Net Catch

Black crappies, bluegills, and white suckers comprised 99% of the trap net sample this year (Table 1). Channel catfish, black bullhead, green sunfish, common carp, and yellow perch were also sampled.

Table 1. Total catch from ten overnight trap net sets at Marindahl Lake, Yankton County, August 10-12, 2009.

Species	Number	Percent	CPUE[1]	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Crappie	699	56.1	69.9	±32.1	43.6	33	0	95
Bluegill	280	22.5	28.0	±12.1	41.6	73	0	92
White Sucker	254	20.4	25.4	±8.4	10.2	99	83	80
Channel Catfish	5	0.4	0.5	±0.5	6.0	--	--	--
Black Bullhead	3	0.2	0.3	±0.2	0.7	--	--	--
Green Sunfish	3	0.2	0.3	±0.2	0.1	--	--	--
Common Carp	1	0.1	0.1	±0.1	0.5	--	--	--
Yellow Perch	1	0.1	0.1	±0.1	0.0	--	--	--

* 6 years (1997, 1999, 2001, 2003, 2005, 2007)

[1] See Appendix A for definitions of CPUE, PSD, and mean Wr.

Table 2. Catch per unit effort by length category for various fish species captured with trap nets in Lake Marindahl August 10-12, 2009.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Black Crappie	--	69.9	46.6	23.3	--	69.9	±32.1
Bluegill	--	28.0	7.3	20.7	--	28.0	±12.1
White Sucker	--	25.4	0.3	4.2	20.9	25.4	±8.4
Channel Catfish	--	0.5	0.4	0.1	--	0.5	±0.5
Black Bullhead	--	0.3	0.3	--	--	0.3	±0.2
Green Sunfish	--	0.3	0.3	--	--	0.3	±0.2
Common Carp	--	0.1	0.1	--	--	0.1	±0.1
Yellow Perch	--	0.1	--	0.1	--	0.1	±0.1

Length categories can be found in Appendix A.

Bluegill

Management objective: Maintain a bluegill fishery with a trap net CPUE of at least 20 and RSD-18 of at least 20.

CPUE, PSD and RSD-18 remained the same as 2007 (Table 3). Growth is above average through age-3 then slows considerably and older fish experience high mortality (Table 4). The RSD-18 of less than10 indicates few fish ever exceed 18 cm (7 in) in length. The average length of sampled bluegills has ranged from 14-16 cm (5.5- 6.3 in) since 1997. The population is maintained entirely by natural reproduction (Table 10). Since 2006, 568 adult bluegills have been removed from the lake and stocked into other waters in an effort to improve growth rates and average length.

Table 3. Bluegill trap-net CPUE, PSD, RSD-18, RSD-P, and mean Wr for Marindahl Lake, Yankton County, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	56.9		63.4		45.0		26.3		28.0	47.8
PSD	84		53		57		74		73	63
RSD-18	6		0		0		4		6	4
RSD-P	0		0		0		0		0	0
Mean Wr	110		92		89		94		92	99

*5 years (1999, 2001, 2003, 2005, 2007)

Table 4. Average back-calculated lengths (mm) for each age class of bluegill in Marindahl Lake, Yankton County, 2009.

			Back-calculation Age							
Year Class	Age	N	1	2	3	4	5	6	7	8
2008	1	110	83							
2007	2	158	44	118						
2006	3	4	70	148	166					
2005	4	10	51	118	158	178				
All Classes		**282**	**62**	**128**	**162**	**178**				
Statewide Mean			55	103	141	166				
Region III Mean			60	116	157	180				
SLI* Mean			53	101	138	163				

* Small Lakes and Impoundments

Black Crappie

Management objective: Maintain a black crappie fishery with a trap net CPUE of at least 20 and PSD of at least 40.

Black crappie abundance in Marindahl Lake is usually high but they seldom achieve a large size. In 2006, 2008 and 2009, 11,862, 4,360 and 897 adult crappies, respectively, were removed from the lake and stocked into other waters. This was done to determine if decreased abundance would result in increased growth for the remaining fish. Trap-net CPUE declined by over half in 2007 suggesting that the 2006 removal effort had an effect on density (Tables 5 and 6). A very large year class was produced in 2008 and CPUE has increased to the 2005 level (Table 6). However, more crappies over 200 mm (8 in) were caught in the 2009 netting survey than ever before, and anglers report catching larger crappies in 2009.

Age-1 and age-2 black crappies sampled in 2009 were somewhat longer than similar-aged fish sampled in previous years (Table 6). Hopefully, this is an early indication that the fish removals may have helped to improve growth. However, abundance remains high and continued improvements in growth at older ages may not be realized.

The length-frequency histograms in Figure 2 show that natural recruitment is fairly consistent. Like bluegills, the black crappie population is maintained solely by natural reproduction.

Table 5. Black crappie trap-net CPUE, PSD, RSD-P, and mean Wr for Marindahl Lake, Yankton County, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	38.5		19.4		62.3		35.2		69.9	38.6
PSD	31		32		10		11		33	28
RSD-P	1		1		1		0		0	1
Mean Wr	117		100		97		101		95	105
Mean Length (mm)			175		178		186		180	

*5 years (1999, 2001, 2003, 2005, 2007)

Table 6. Average back-calculated lengths (mm) for each age class of black crappie in Marindahl Lake, Yankton County, 2009.

			Back-calculation Age							
Year Class	Age	N	1	2	3	4	5	6	7	8
2008	1	349	99							
2007	2	76	83	163						
2006	3	166	77	150	190					
2005	4	108	82	149	182	204				
All Classes		**699**	**85**	**154**	**186**	**204**				
Statewide Mean			83	147	195	229	249			
Region III Mean			95	167	219	253	274			
SLI* Mean			78	134	180	209	226			

Largemouth Bass

Management objective: Maintain a largemouth bass fishery with an electrofishing CPH of at least 20 and RSD-P range of 20-40.

Largemouth bass electrofishing catch per hour (CPH) decreased to 7.0 in 2009 (Table 7) and all but three of the bass sampled were at least stock length (20 cm, 8 in). Recruitment has been poor in Marindahl and other small impoundments in the region. Growth is well above the statewide average and near the region 3 mean. The length-frequency histograms in Figure 3 show a population ranging in length from 150-450 mm (5.9-17.7 in). Based on ages assigned using scales, seven year classes from age-1 to age-7 were represented in the sample (Table 8).

Freeze-branded age-1 bass were stocked in June of 2009 as part of a SDSU Master's degree study to evaluate stocking success with advanced juvenile bass. A population estimate done by electrofishing in August and September estimated that over a third (740 fish) of the 2,025 stocked bass had survived during their first 3 months in the lake. A follow-up population estimate done in spring 2009 will estimate survival of stocked bass over the winter. An additional stocking of 3,753 advanced juvenile largemouth bass is scheduled for spring of 2010. Subsequent electrofishing will be done to monitor the success of this stocking.

Table 7. Largemouth bass electrofishing CPH, PSD, RSD-P, and mean Wr for Marindahl Lake, Yankton County, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	15.5		41.0		19.0		14.0		7.0	22.4
PSD	71		46		65		92		91	69
RSD-P	52		29		22		64		27	42
Mean Wr	92		100		101		99		109	98

*4 years (2001, 2003, 2005, 2007)

Table 8. Average back-calculated lengths (mm) for each age class of largemouth bass in Marindahl Lake, Yankton County, 2009.

			Back-calculation Age							
Year Class	Age	N	1	2	3	4	5	6	7	8
2008	1	3	103							
2007	2	1	105	271						
2006	3	2	79	192	319					
2005	4	1	94	195	258	313				
2004	5	4	95	179	254	304	343			
2003	6	1	144	206	309	353	402	423		
2002	7	1	86	219	259	350	369	395	419	
All Classes		**13**	**101**	**210**	**282**	**330**	**371**	**409**	**419**	
Statewide Mean			96	182	250	305	342			
Region III Mean			111	212	287	347	383			
SLI* Mean			99	183	246	299	332			

All Fish Species

White sucker trap-net CPUE has increased substantially from previous surveys, while black bullhead and common carp densities remain low (Table 9). Channel catfish CPUE has decreased from the peak in 2003 of nearly 18 fish per trap net.

Table 9. Trap-net CPUE for all fish species sampled in Marindahl Lake, Yankton County, 2001-2009.

Species	2001	2002	2003	2004	2005	2007	2008	2009
GOE	--		--		0.1	--		--
COC	--		0.3		0.5	1.3		0.1
WHS	5.1		7.4		22.7	25.4		25.4
CCF	0.7		17.9		12.1	3.9		0.5
BLB	--		--		0.5	0.1		0.3
LMB	--		--		0.1	--		--
BLC	38.5		19.4		62.3	35.2		69.9
GSF	--		0.1		0.1	0.4		0.3
BLG	56.9		63.4		45.0	26.3		28.0
HYB	--		--		0.2	--		--
YEP	--		0.1		0.3	--		0.1

GOE (Goldeye), COC (Common Carp), WHS (White Sucker), CCF (Channel Catfish), BLB (Black Bullhead), LMB (Largemouth Bass), BLC (Black Crappie), GSF (Green Sunfish), BLG (Bluegill), HYB (Hybrid Sunfish), YEP (Yellow Perch)

MANAGEMENT RECOMMENDATIONS

1. Continue to survey the fish community with trap nets and electrofishing every other year with the next one occurring in 2011.

2. The abundance of channel catfish in survey nets has varied greatly over the last 10 years, possibly suggesting limited or sporadic recruitment. Consider a study to gather information on channel catfish populations in Marindahl and other small impoundments in southeast South Dakota

3. If improved growth of black crappies or bluegills is observed after the recent removals, continue to monitor and reduce panfish abundance by intensive netting to maintain good growth and improve the size structure.

Table 10. Stocking record for Marindahl Lake, Yankton County, 1991-2009.

Year	Number	Species	Size
1991	7,000	Largemouth Bass	Med. Fingerling
1992	27,000	Channel Catfish	Fingerling
	13,500	Largemouth Bass	Med. Fingerling
1993	136,940	Rainbow Trout	Fingerling
	27,000	Walleye	Sml. Fingerling
1994	6,720	Channel Catfish	Fingerling
	4,050	Walleye	Sml. Fingerling
1996	3,375	Walleye	Lrg. Fingerling
1997	13,500	Largemouth Bass	Fingerling
1998	13,500	Largemouth Bass	Fingerling
1999	13,000	Largemouth Bass	Fingerling
2002	20,000	Channel Catfish	Fingerling
	139	Largemouth Bass	Adult
2003	281	Largemouth Bass	Adult
2004	200	Largemouth Bass	Juvenile
2006	320	Largemouth Bass	Adult
2009	2,025	Largemouth Bass	Juvenile

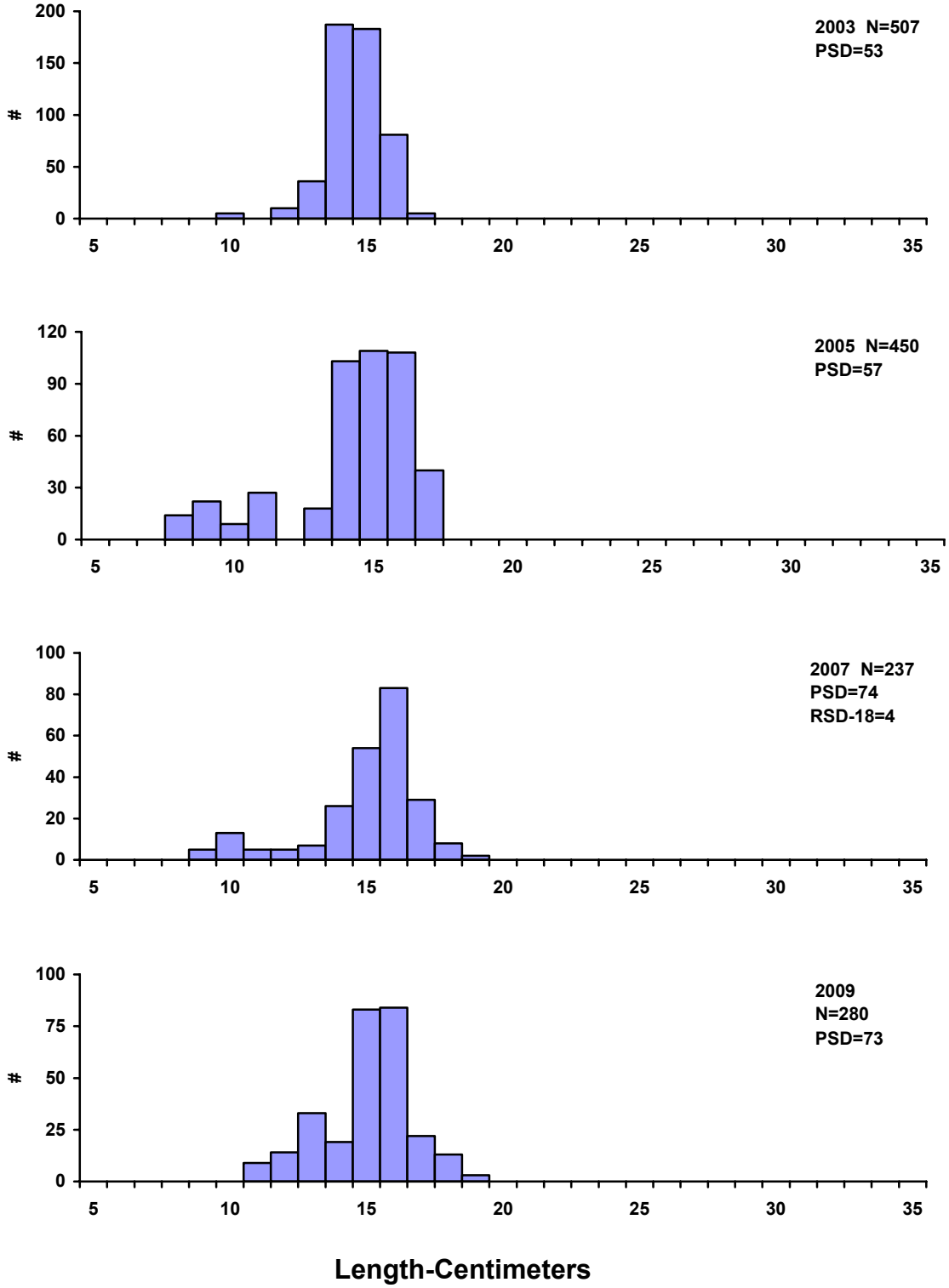


Figure 1. Length frequency histograms for bluegill sampled with trap nets in Marindahl Lake, Yankton County, 2003, 2005, 2007, and 2009.

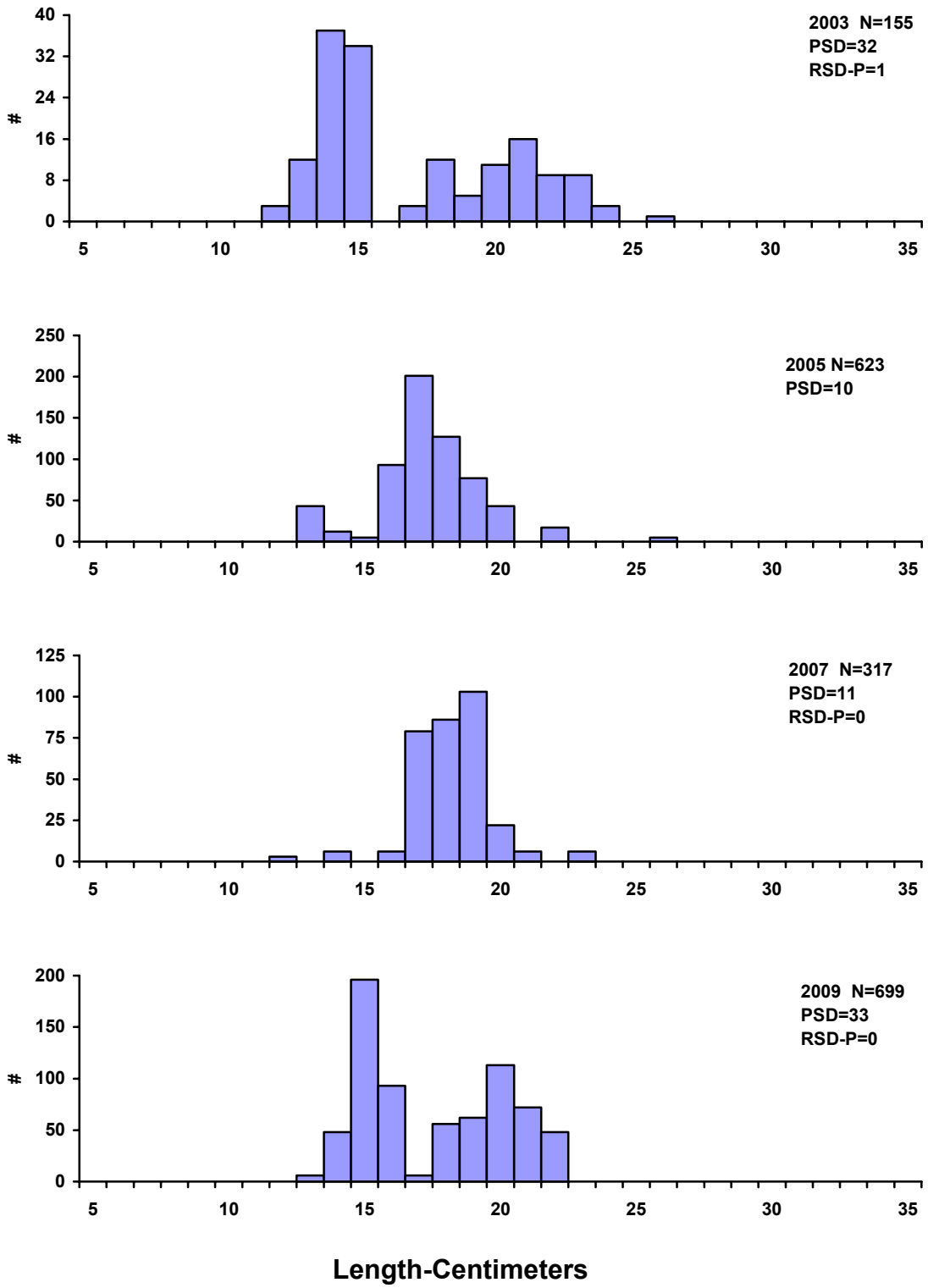


Figure 2. Length frequency histograms for black crappie sampled with trap nets in Marindahl Lake, Yankton County, 2003, 2005, 2007, and 2009.

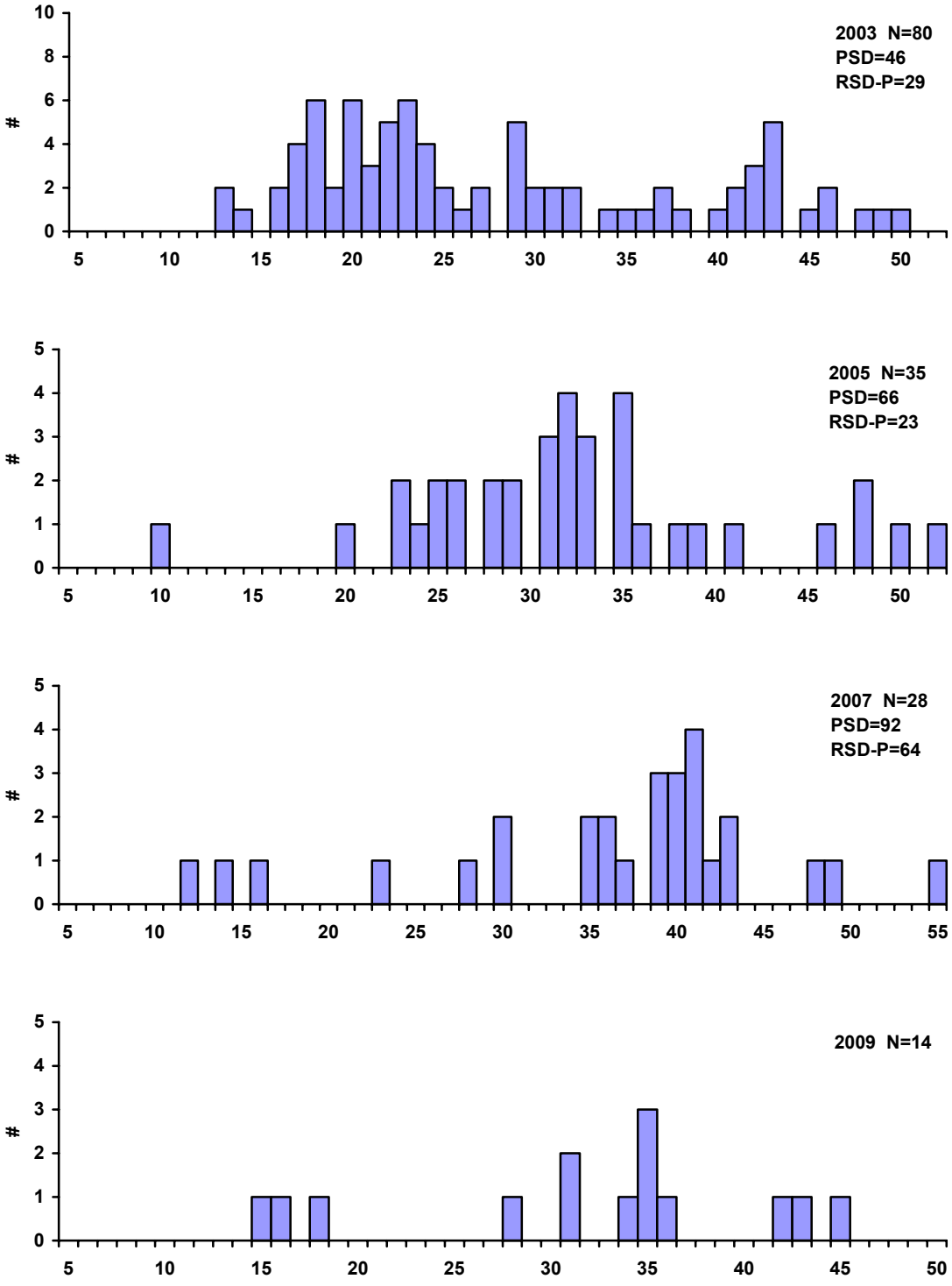
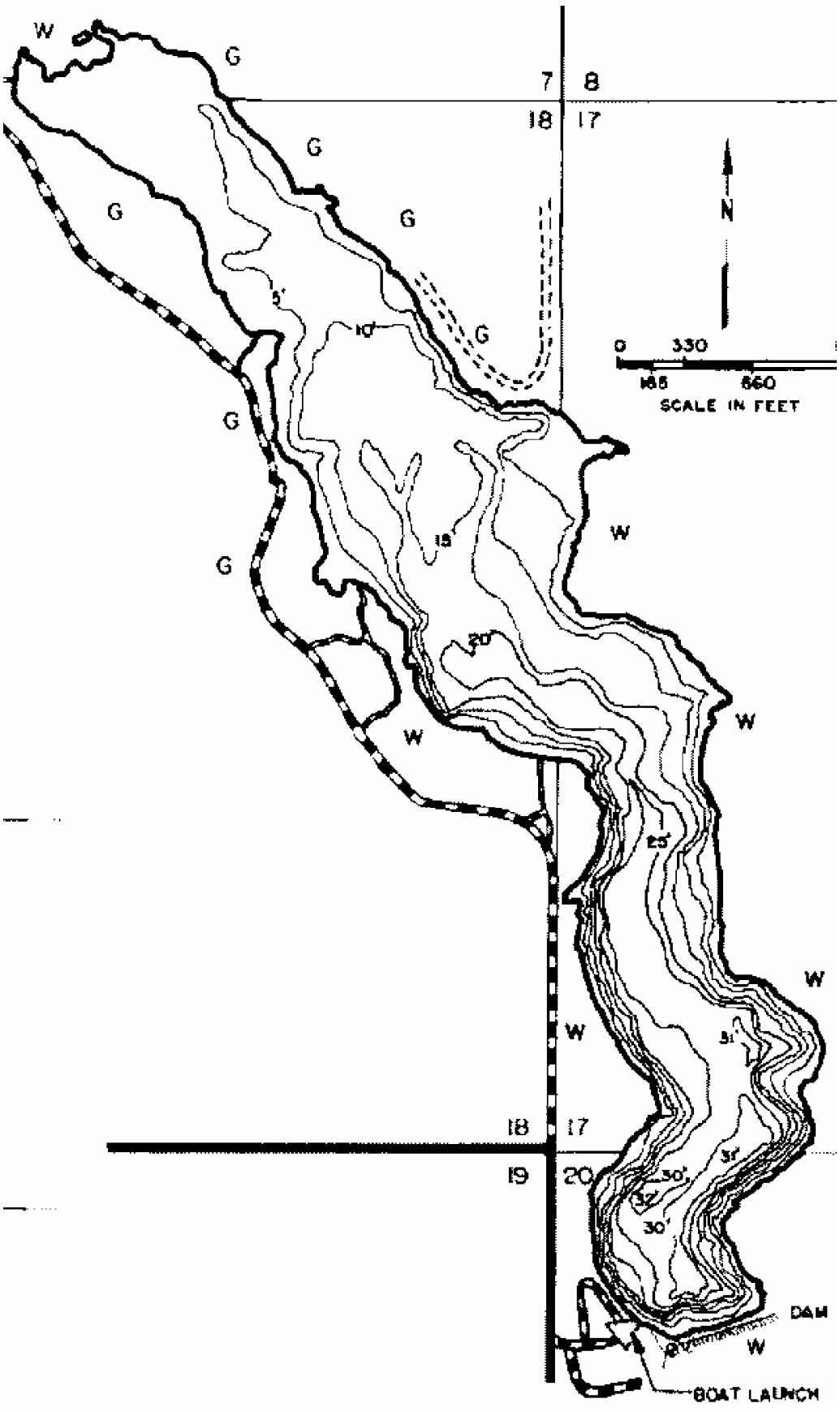


Figure 3. Length frequency histograms for largemouth bass sampled by electrofishing in Marindahl Lake, Yankton County, 2003, 2005, 2007, and 2009.


W
G
7
8
18
17
N
0
330
165
660
SCALE IN FEET
5'
10'
15'
20'
25'
30'
35'
DAM
BOAT LAUNCH
19
20

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.